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Hypertension in Diabetics on Maintenance Hemodialysis

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Introduction

Hypertension (Hy), defined as a blood pressure ≥ 140/90mmHg, is an extremely common comorbid condition in diabetes mellitus (DM) effecting 20-60% of patients (pts), depending on obesity, ethnicity and age. In type 2 DM, Hy is often present as a part of the metabolic syndrome, insulin resistance also including central obesity and dyslipidemia. In type 1 DM, Hy may reflect the onset of diabetic nephropathy (DN). Hy substantially increases the risk of both macrovascular and microvascular complications, including stroke, coronary artery disease and peripheral vascular disease,
retinopathy and possible neuropathy.

Diabetes increases the risk of coronary events twofold in men and fourfold in women. Part of this increase is due to the frequency of associated cardiovascular risk factors such as Hy, dyslipidemia and clotting abnormalities. In observational studies people with both DM and Hy have approximately twice the risk of cardiovascular disease compared with non-diabetic hypertensive people. They are also at increased risk for diabetes specific complications including retinopathy and nephropathy. In the epidemiological study "U.K. Prospective Diabetes Study" (UKPDS) each 10mmHg decrease in mean systolic blood pressure was associated with reducing in risk of 12% for any complication related to diabetes, 15% for death related to diabetes, 11% for myocardial infarction and 13% for microvascular complication. No threshold of risk was observed for endpoint (1,2).

Using various definitions for Hy, the prevalence of Hy in hemodialysis (HD) pts is estimated to be about 75% (3,4). In a more recent study the prevalence, treatment and control of Hy, defined as an overage predialysis systolic blood pressure > 150mmHg or diastolic blood pressure >85mmHg, or the use of antihypertensive medications was investigated in a cohort of 2535 clinical stable adult HD pts (5). Hy was present in 86% of pts. The prevalence of Hy in contrast to that observed in the general population did not increase linearly with age and was not affected by gender or race.

Hy was controlled adequately in only 30% of the hypertensive pts. In the remaining patients Hy was either untreated (12%) or was poorly controlled (58%). Effective antihypertensive treatment reduces the risk of development and progression of nephropathy and as is especially evident with angiotensin-converting enzyme (ACE) inhibitors (ACEi) and angiotensin receptor blockers (ARB) it lowers cardiovascular morbidity and mortality (6,7). Accordingly, current consensus groups have recommended tight BP control (<130/80 mmHg) in diabetic patient (6,8,9).

Aim

The aim of the study was to evaluate the prevalence of Hy and the drug treatment of Hy in a cohort of pts with DM on maintenance HD.

Patients and methods

Data from medical records (histories) of 109 (10%) pts, male 60 (55%) and female 49 (45%) with DM type 1 and DM type 2 on HD were analyzed from a total number of 1114 pts on HD in all 17 dialysis centers in the Republic of Macedonia. The date 31.12.2002 was taken as a "critical day" for date evaluation of pts on HD with DM. Data were collected by a specially prepared questionnaire. Each patient was hemodialyzed three times weekly between 3.5 and 4 hours, using a dialysate containing 142mEq/L sodium and bicarbonate or acetate bath. Blood pressures (BP) were recorded using mercury sphygmomanometers with the pts in sitting position.

Results and discussion

From a total number of 1114 pts on maintenance HD in the Republic of Macedonia with DM type 1 and DM type 2 on HD were 109 (10%) pts, male 60 (55%) and female 49 (45%). The mean age of the DM type 1 group was 47±12 years and their diabetic history was 16±10 years. In the group with DM type 2 the mean age was 60±8 years and their mean diabetic history was 13±8 years. Pts with DM type 2 on oral anti hyperglycemic drugs were 28 (26%) and on insuline were 62 (57%) pts with average period of insulin use of 8±5 years. From all pts smokers were 21% and alcohol consumers 13%. Average body mass index in DM type 1 pts was 24.5±5.38 kg/m^2 and in DM type 2 pts was 25.4±4.96 kg/m^2. We can conclude that pts with DM type 2 were more obese than pts with DM type 1. We can see from Table 1 that cardiovascular diseases (CVD) were highly prevalent at the start of HD: Hy (91%), volume dependent very common, pectoral angina (7.2%), myocardial infarction (5.4%), intermittent claudication (10%), pain during rest (6.3%), diabetic foot (3.6%), cerebrovascular accident (7.2%). The most common co-morbidity during maintenance HD was Hy in 40.54% with an average duration of 12.3 (±8.31) years. Familial history of HT had 43.24% of pts. The other co-morbidity during MHD were: pectoral angina (19%), myocardial infarction (5.4%), intermittent claudication (10%), pain during rest (14%), diabetic foot (9%), cerebrovascular accident (8%).

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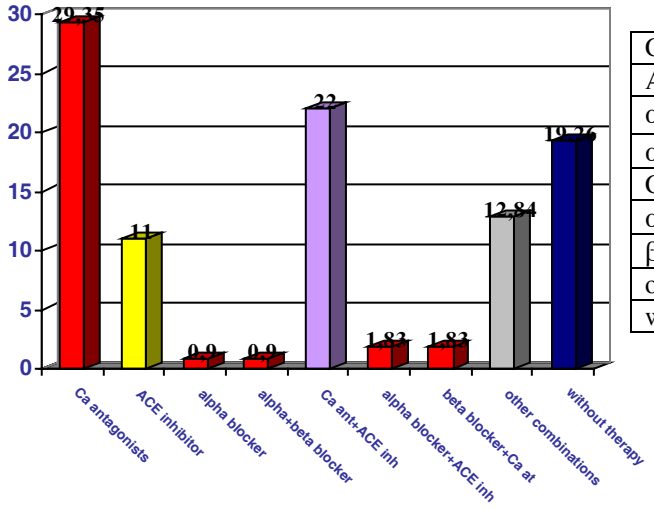
Table 1: Co-morbidity in the patients with DM before and during the maintenance hemodialysis

Co-morbidity	Before maintenance HD	During maintenance HD
HYPERTENSION	91%	40%
PECTORAL ANGINA	7%	19%
MYOCARDIAL INFARCTION	5%	5%
INTERMITTENT CLAUDICATIO	10%	10%
CEREBROVASCULAR ACCIDENT (CVI)	7%	8%
PAIN DURING REST	6%	14%
DIABETIC FOOT	4%	9%

We don't have data about antihypertensive therapy before maintenance HD.
Therapy of Hy during maintenance HD was: Ca antagonists in 29.35%, ACE inhibitors in 11%, α blockers in 0.9%, α+β blockers in 0.9%, Ca antagonists+ACE inhibitors in 22%, α blockers+ACE inhibitors in 1.83%, β blockers+ Ca antagonists in 1.83%, other combinations in 12.84% and without therapy 19.26% pts (Shown on Table 2).

Table 2: Antihypertensive drugs used in treatment of hypertension in diabetics on maintenance hemodialysis



Ca antagonists	29.35%
ACE inhibitors	11%
α Blockers	0.9%,
α + β Blockers	0.9%,
CA antagonists + ACE inhibitors	22%,
α Blockers + ACE inhibitors	1.83%
β Blockers + CA antagonists	1.83%,
other combinations	12.84%
without therapy	19.26%

There is no early detection of DN and Hy in our pts. Hy was present in 91% of pts with DM at the start of maintenance HD and in 41% of pts during maintenance HD. We have not achieved tight BP control of <130/80mmHg in our pts. Effective antihypertensive treatment reduces the progression of DN and improves cardiovascular progression of DN and improves cardiovascular prognosis. Accordingly, tight BP control (<130/80mmHg) is current recommended in diabetic pts. Achieving BP target s represents the most important determinant of cardiovascular and renal protection. However, it has been suggested that specific class of antihypertensive drugs may exert additional organ protection beyond their BP control. The pharmacological blockade of the renin-angiotensin aldosteron system has been shown to convey greater renal and cardiovascular protection compared with other classes of drugs. In particular, studies focusing on renal end point suggest that angiotensin-converting enzyme inhibitors (ACEi) are the best choice drugs in type 1 diabetics. Both ACEi and angiotensin receptor blockers (ARB) prevent the progression from microalbuminuria to clinical proteinuria in type 2 diabetes, but ARB provide better renoprotection in pts with overt nephropathy. Regarding cardiovascular protection several studies (but not all) have shown that ACEi exert a protective effect on diabetic pts. It should be noted that to achieve maximal renal and cardiovascular protection, diabetic pts require integrated therapeutic intervention including not only several groups of antihypertensive drugs but statins and antiplatelat therapy as well (10).
In **conclusion** it is recommended that lower blood pressure of 130/80mmHg should be the cut off point for defining Hy in DM pts. The first line antihypertensive drugs should be ACEi and ARB. Optimizing the use of medications and closer attention to nonpharmacological intervention, such adjustment of dry weight a low sodium diet and exercise may improve control. However, reaching the target level of BP and avoidance of fluid overload are probably more important than the choice of individual anti-Hy drugs

during ESRD and maintenance HD. Co-operation of nephrologist during treatment of diabetic pts on maintenance HD with diabetologists, cardiologists, ophthalmologists and general physicians are imperative for long survival and good quality of live.

Key words: diabetes mellitus; hypertension; end stage renal disease; maintenance hemodialysis; antihypertensive drugs;

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